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# THE SUGAR MAPLES, WITH A WINTER SYNOPSIS OF ALL NORTH AMERICAN MAPLES.

BY WILLIAM TRELEASE.

North American botanists generally recognize one eastern species of sugar maple with a well-marked variety, one in the Gulf States, and a third species in the mountains of the Southwest. Each of these is so variable as to weaken the lines of specific separation, and in the last treatment of the maples by an American botanist\* they are all united as forms or varieties of a single species. In contrast with this conservatism, European botanists are disposed to increase the number of separable species. Pax,† in his monograph of the genus *Acer*, recognizes three species of his group *Saccharina*, comprising the eastern and southern sugar maples, while the southwestern species is maintained in his group *Campestris*. Wesmael,‡ in a later review of the genus, follows Pax in keeping the southwestern species apart from the group *Saccharina*, of which latter he recognizes only one species with two subspecies corresponding to the other two species admitted by Pax. Quite recently, von Schwerin, in an enumeration of the maples from a horticultural standpoint,§ carries the separation of forms even further than Pax, since he maintains all of the species admitted by the latter, while he recognizes three varieties and seven named forms of the northern sugar maple.

I was led by these publications to make an examination of the material in the herbarium and arboretum of the Missouri Botanical Garden and in Tower Grove Park, and

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\* Sargent, *Silva of North America*, ii. 1891, 97.

† Engler's *Bot. Jahrbücher*, 1886, vii. 241, and 220.

‡ *Revue critique des espèces du genre Acer*.—Gand, 1890, pp. 46, 60-61.

§ *Gartenflora*, 1893, xlii. 455.

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to review the principal literature of the genus *Acer*, in the hope of naming the forms represented. As the conclusions reached were somewhat different from those of recent writers on the genus, I have taken occasion to see the contents of the principal herbaria of the country,\* and the results of my study are presented here as showing at least the range of the forms and the great variability of the eastern sugar maples.

It is now commonly understood that the name *Acer saccharinum*, which the common sugar maple has borne until quite recently, was in reality given by Linnaeus in his *Species Plantarum* (1753) to the silver maple; † and the tendency now is to restore this name to the plant it was originally applied to, notwithstanding the necessary confusion for a time attending the change. Granting the propriety and necessity of making this substitution, however, there appears to be some difference of opinion as to the names now to be adopted for the sugar maple and its forms. The oldest other name generally admitted as pertaining to this species, is *A. saccharum* of Marshall.‡ On the authority of Pax and Schwerin, the *Acer palmifolium* of Borckhausen § is the same species. Later names for the common sugar maple and the black maple are *A. barbatum*

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\* My thanks are due Professor Britton of Columbia College, Dr. Coville of the United States Department of Agriculture, Dr. Mohr of Mobile, Dr. Robinson of Harvard University, and Professor Sargent of the Arnold Arboretum, for the use of the material in their care. I am also indebted to Mr. Marcus E. Jones of Salt Lake City, Dr. J. Schneck of Mt. Carmel, Mr. Trevor Kincaid of Olympia, Wash., Mr. Geo. W. Letterman of Allenton, Mo., Mr. E. M. Wilcox and Mr. W. C. Werner of Columbus, O., Mr. C. F. Wheeler of Lansing, Mich., and Mr. Thomas Howell of Arthur, Oregon, for specimens collected or contributed for my use.

† For the history of this name see Sargent, *Garden and Forest*, iv, 148.

‡ *Arbustrum Americanum*, 1785, 4.

§ *Flora der oberen Grafschaft Catzenelnbogen*, 1795, 109. — I am indebted to Professor Urban for a transcript, from which, however, I am not very certain that Borckhausen really meant a form of the sugar maple.

Michaux,\* and *A. nigrum* Michaux, f.† If, as is now generally done, we take Walter's *Acer Carolinianum* ‡ to be the red maple, these are the only published names applicable to the eastern sugar maple, aside from the recent varietal and form names of Pax and Schwerin.

Unfortunately, some doubt applies to both of the names *saccharum* and *barbatum*. In advocating the restoration of the Linnean name *saccharinum* for the silver maple, Professor Sargent § considered it necessary to exclude Marshall's name for the sugar maple, because he believed that a name so nearly identical with *saccharinum* as is *saccharum*, could lead only to hopeless confusion, so that he proposed to take up the name *barbatum* of Michaux; and he finds support of this conclusion || in the fact that Marshall's description is so indefinite as to leave one in some doubt as to what tree he really had in mind when he described his *Acer saccharum*. While the description given by Marshall is ambiguous, the green color of the flowers (contrasted presumably with red), and the flowering "in manner of the scarlet maple" (presumably referring to the subsessile or umbellate cluster as contrasted with the elongated inflorescence of the mountain and striped maples), seem to me to confirm rather than render doubtful the conclusion that he had the sugar maple in mind. There is, in fact, more doubt as to the plant intended by Michaux when he described his *Acer barbatum*, for though the name appears in most manuals of the thirty years succeeding its publication, Pursh ¶ is the only botanist of that time who seems to have done more than copy or paraphrase a description of it, until Torrey and Gray\*\* state that they found in Barton's herbarium foliage specimens so named apparently

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\* Fl. Bor. Amer. 1803, ii. 253.

† Hist. Arb. (Sylva, ed. 1), 1810, ii. 238.

‡ Flora Caroliniana, 1788, 251.

§ Garden and Forest, 1889, ii. 364.

|| Garden and Forest, iv. 148.

¶ Fl. (1814), i. 266, — with *A. Carolinianum* as a synonym.

\*\* Flora of North America, i. 249.

by Pursh, which they pronounce *Acer rubrum*. Nuttall\* on their authority, as he states, goes so far as to declare *barbatum* “a nonentity, as it [or Pursh’s conception of it] is founded upon the flowers of the sugar maple, the fruit of the red maple, and a leaf (probably) of the *Acer spicatum*.” It may be added that the name *barbatum* was originally applied because of the bearding within the flowers, and not with reference to any pubescence of the lower surface of the leaves. As between the two names *saccharum* and *barbatum*, I should, therefore, choose the former as more certainly applying to the sugar maple, and because of its prior publication, and this conclusion has been reached also by Britton,† Hitchcock,‡ and Sudworth.§ If the identification of Borkhausen’s *Acer palmifolium* is correct, this name in point of priority stands between *saccharum* and *barbatum*. It seems, however, to refer to the more typical form of the species, denoted by the former name, so that it does not invalidate the use which I shall propose to make of *saccharum* for the type, and of *barbatum* for a fairly characterized variety of the sugar maple to which the original description of *barbatum* applies more closely than to any other.

As the result of a careful examination of the available material, I am disposed to recognize three species of the group *Saccharina*, two of them represented by fairly marked varieties in addition to the typical form, — namely, *A. saccharum*, with its varieties *barbatum* and *nigrum*, *A. Floridanum*, with its variety *acuminatum*, and *A. grandidentatum*, the last named certainly aberrant.

*Acer saccharum* and its variety *nigrum* do not appear to

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\* Sylva, ii. 88.

† Cat. Plants of New Jersey, 78.

‡ Trans. St. Louis Acad., v. 490.

§ Dept. Agriculture Report, 1892, 325. It may be of interest to note that in a French translation of Marshall’s book by Lézermes (1788), the name is replaced by *saccharinum*, apparently because of the translator’s feeling that the spelling of Marshall was the result of an error; a possibility which Professor Sargent also has suggested.

pass directly into one another, but the former does grade into the simpler leaved variety *barbatum*, and it is also difficult to determine whether a very few herbarium specimens go into *barbatum* or *nigrum*. Were it not for these, I should agree with Professor Bailey in treating the latter as a distinct species. All three forms have essentially the same distribution, the variety *nigrum* being apparently a little more restricted than the others, and the most western form belonging to the variety *barbatum* rather than the type.

The typical *saccharum*, which is evidently the plant of which Wangenheim \* figures a leaf under the name *saccharinum*, is the variety *pseudo-platanoides* of Pax † and Schwerin. ‡ The description and figure in the several editions of the Sylva of the younger Michaux leave no doubt that what is here called variety *nigrum* is the tree to which he applied *nigrum* as a specific name, and its extreme forms are well represented by Schwerin, § who, mistaking for the true *nigrum* what I have called *barbatum*, as has been done also by many American botanists, describes them as pertaining to a new variety which he names var. *concolor* because of the green lower surface of the leaves.

Following Professor Bailey, who has clearly indicated the characters of *nigrum*, || I have tried to associate with the leaf characters, others drawn from the inflorescence and fruit; but in this attempt I have failed, because of insufficiency of well authenticated flowering specimens of the different forms (though I am disposed to think that good inflorescence characters may exist), and so great a variability in the size, form and divergence of the fruit wings that I am convinced of the inapplicability of this character.

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\* *Beitrag zur deutschen holzgerechten Forstwissenschaft, die Anpflanzung nordamericanischer Holzarten, mit Anwendung auf deutsche Forste, betreffend*, 1787, pl. 11, f. 26.

† Engler's Bot. Jahrb. 1886, vii. 242.

‡ *Gartenflora*, xlii. 455, f. 95, no. 1.

§ *l. c.* 456, f. 95, nos. 6 and 7.

|| *Bot. Gazette*, xiii. 214.

Utilizing such differences as I find, I separate the maples of the *saccharum* group as follows, admitting under each only such citations as I am reasonably sure of, and without having attempted to make the bibliography at all complete. Specimens without mature foliage have not been cited, for the reasons above given.

**ACER SACCHARUM** Marshall, *Arbustrum* (1785), 4; Newhall, *Trees N. E. Amer.* 150, f. 75. — *A. saccharinum* Wangenheim, *Nordamer. Holzarten* (1787), 26, pl. 11, f. 26; Michaux, *Sylva*, i. 101, pl. 42; Pursh, *Fl.* i. 266; Hooker, *Fl. Bor.-Amer.* i. 113; Torrey, *Compend.* 170, and *Fl. N. Y.* i. 136; Torrey & Gray, *Fl.* i. 248; Gray, *Manual*, ed. 1, 80, ed. 6, 117, and *School and Field Book*, 91; Browne, *Trees*, 82; Emerson *Mass.* ed. 2, 558, with plate; Bailey, *Popular Gardening*, 1887, 24, in part, with figure; and *Bot. Gazette*, xiii. 214, in part. — *A. barbatum* Sargent, *Silva*, ii. 97, pl. 90. — *A. palmifolium* var. *pseudoplatanoides* Schwerin, *Gartenflora*, xlii. 455, f. 95, no. 1. — *A. saccharinum* var. *pseudoplatanoides* Pax, *Engler's Jahrb.* vii. 242, in part; Wesmael, *Acer*, 61.

Bark gray; internodes mostly slender and elongated, commonly glossy and reddish; buds gray, conical, slender and acute; petioles little dilated at base, not concealing the mature buds, without stipules; leaves thin, typically large (usually 4 to 7 inches broad), flat, dull, usually light green above, the lower surface grayish, glabrous to pubescent, or exceptionally quite hirsute when young, isodiametric, truncate at base to slightly cordate with an open sinus, or broadly cuneate, rather deeply 5-lobed, except for some smaller 3-lobed leaves near the ends of the branches, with typically narrow sinuses, the three larger lobes with parallel sides or dilated upwardly and each with a slender apical acumination often sinuously bidentate on the sides, and two similar lateral acuminations, or the lateral lobes merely sinuate on the upper margin, the smaller outermost lobes mostly sinuously 1 to 2 toothed on the lower margin;

fruit large ( $6 \times 10$  mm.), the outer lines of the large wings ( $8$  to  $12 \times 16$  to  $28$  mm.) nearly parallel or spreading to something less than a right angle.—Plate 4.

Range, Nova Scotia to West Virginia, Illinois, Missouri (?), Ohio, Michigan and Canada.—Specimens examined from Nova Scotia (Macoun, 1883), Canada (Ottawa, Macoun, July 24, 1882; Termiscouta Co., Northrop, 135; Wingham, Morton, June 20, 1891), New Hampshire (M. 119 in hb. Sargent), Massachusetts (Essex Co., Pickering), New York (Torrey; Greene Co., Miss Vail, June 27, 1891 — with a second specimen which if taken alone would be referred to var. *barbatum*), Pennsylvania (Easton, Porter, July 1891; West Chester, Darlington, “the common form”), West Virginia (White Sulphur Springs, Britton, Aug. 19, 1890), Ohio (Cincinnati, Lloyd, 1890; Painesville, Werner, 1892), Illinois (French; Grand Tower, Vasey), and Michigan (Lansing, Wheeler, Oct. 1892),—Cultivated at Cambridge, 1859; Kew, Nicholson, 1880, 1342, and St. Louis, 1893.

**ACER SACCHARUM** var. **BARBATUM** (Michaux).—(*A. barbatum* Michx. Flora, ii. (1803), 252; Pursh, Flora, i. 266; Torrey, Compend. 169; Torrey & Gray, Fl. i. 249; Beck, Bot. 63; Eaton, Manual, ed. 4, 186, ed. 5, 90, ed. 6, 2, ed. 7, 140; Eat. & Wright, 112?).—*A. saccharum* var. *nigrum* Newhall, Trees N. E. Amer. 152, f. 76.—*A. barbatum* var. *nigrum* Sargent, Silva, ii. 99 in part and pl. 91.—*A. saccharinum* Bailey, l. c. in part.—*A. saccharinum* var. *glaucum* Pax, Engler's Jahrb. vii. 242 in part; Wesmael, Acer, 61.—*A. palmifolium* var. *nigrum* Schwerin, Gartenflora, xlii. 456, f. 95 no. 4.—*A. Rugelii* Pax, Engler's Bot. Jahrb. vii. 1886, 243; Schwerin, Gartenflora, xlii. 457.—*A. saccharinum* subsp. *Rugelii* Wesmael, Acer, 61.

Bark gray to almost black; internodes often shorter and stouter, commonly dull but reddish; buds gray, pubescent or dark, conical ovoid, often obtuse; petioles as in the last and



without stipules; leaves firm, of medium size (usually about 4 in. broad), flat, somewhat glossy and of various shades of green above, pale or glaucous and downy to glabrous beneath, mostly broader than long, cordate with shallow open basal sinus to truncate, 3-lobed with very open round sinuses (the upper margin of the lateral lobes often spreading nearly in a straight line), the lobes sinuously narrowed from the base to a single acumination, or the median lobe sometimes dilated by a pair of blunt shoulders, one or two similar dilatations also on the lower margin of each lateral lobe, and exceptionally developed into short complementary lobes; fruit as in the last.—Plates 5 and 6.

Range, Connecticut to New Jersey, Tennessee, Missouri and Michigan. — Specimens examined from Connecticut (Norwich, Lumsden, July 1, 1885), New York (Sullivan Co., Eggert, 1873; Yates Co., Buckley), New Jersey (Weehawken, Schrenk), Pennsylvania (Bedford, Soulard, Sept. 1860), Ohio (Cincinnati, Lloyd, July 14, 1882), Tennessee, (Dandridge, Rugel, July 1842, — one of the originals of *A. Rugelii*; Knoxville, Rugel, Mar. 1842, — one of the original collections of *A. Rugelii*, — Sargent, September 17, 1888; Nashville, Gattinger, September 1879, — and no. 497\* of Curtiss' exsiccatae), Alabama (Walnut Creek, Mohr, July 31, 1880), Missouri (about St. Louis, Eggert, 1875 and 1877; Allenton, Letterman, various collections, one of July 1883, with the 3 lobes long, tapering and not at all sinuate, of which Mr. Letterman says "only one tree seen;," Washington Co., Letterman, August 20, 1881), Michigan (Lansing, Bailey, September 15, 1887, and Hicks, June 15, 1893; Michigamme, Trelease, July 19, 1887; Alma, Davis, May 1891). — Cultivated in Washington (Vasey, 1873), and about Boston (Sargent, July 1, 1880). A curious form with long caudate lobes, cultivated at Frankfurt am Main (Engelmann, Apr. 1826).

An examination of numerous trees about Allenton, Mo., in company with Mr. George W. Letterman, and about O'Fallon, Mo., shows that as a rule the bark of this variety

soon becomes black, retaining this color for many years, though ultimately by exfoliation it becomes gray on old trees. The characteristic foliage and twig characters are sometimes replaced by those more nearly agreeing with the type of the species, from which, on the whole, I think the variety separable. Of these intermediate forms are the following:—Canada, (Niagara Falls, Schrenk, Aug. 1888; Belleville, Macoun, 1866, 984; Pelee Point, Macoun, June 30, 1882, 985), New York (hb. Gray; Kelsea's, Schrenk, 1883), New Jersey (Sparta, Britton, Sept. 11, 1890), Pennsylvania (Bethlehem, Lochman, June 1891), Tennessee (Carter Co., Small and Heller, July 16, 1891), Illinois (Jonesboro, Wolfe, 1872; opposite St. Louis, Engelmann and Eggert, various collections; about Mt. Carmel, Schneck, numerous specimens, many of them with 5-lobed leaves with the middle lobe dilated upwards, but coriaceous, and with thick mostly blunt buds), and Missouri (Allenton, Letterman, various collections; O'Fallon, Trelease).

**ACER SACCHARUM** var. **NIGRUM** (Michaux, f.) Britton, Trans. N. Y. Acad. 1889, ix. 9; Sudworth, Rept. Secy. Agric. 1892, 325. — *A. nigrum* Michx. f., Hist. Arb. Amer. ii. 1810, 238, pl. 16, and Sylva, various editions, pl. 43; Gray, Amer. Nat. vi. 767, vii. 422; Bailey, Popular Gardening, Nov. 1887, 24, with figure, and Bot. Gazette, xiii. 214; Eaton, Manual, ed. 2, 122, ed. 4, 186, ed. 5, 90, ed. 6, 2, ed. 7, 140; Eat. & Wright, Bot. 112; Pursh, Fl. i. 266; Torrey, Compend. 170; Beck, Bot. 63; Hooker, Fl. Bor.-Amer. i. 113; Wood, Class Book, editions of 1851, 1854 and two styles of 41st ed., 213, editions of 1861, 1865, 1867 and 1868, 286, and Fl. Atl. 74. — *A. saccharinum* var. *nigrum* Gray, Manual, ed. 1, 80, and ed. 6, 117; Browne, Trees, 84, with figure; Torrey, Fl. N. Y. i. 137; Torrey & Gray, Fl. i. 248. — *A. barbatum* var. *nigrum* Sargent, Garden & Forest, iv. 148, f. 27 (stipules), and Silva, ii. 99 in part. — *A. saccharinum* var. *glaucum* Pax,

Engler's Bot. Jahrb. vii. 242 in part; Wesmael, *Acer*, 61. — *A. palmifolium* var. *concolor* Schwerin, *Gartenflora*, xlii. 457, f. 95, nos. 6 and 7.

Bark nearly black; \* internodes stout, sometimes short, dull, buff; buds dark, ovoid, often obtuse; petioles dilated at base so as usually to cover the buds, with adnate triangular or oblong foliaceous stipules; leaves soft but of heavy texture, large (usually 5 to 6 in. broad), with drooping sides, dull and dark green above, clear green and usually persistently downy below, isodiametric, the larger deeply cordate with often closed sinus, 3-to 5-lobed, with shallow broad sinuses from which the lobes are undulately narrowed to an acute or acuminate point, rarely with short lateral acuminations; fruit as in the last.—Plate 7.

Range, Vermont (?) to New York, Virginia, Kentucky, Missouri and Michigan. — Specimens examined from New York, Pennsylvania (Lycoming Co., Small and Heller, Sept. 19, 1890; Westmoreland Co., Pierron, May 1, 1877), District of Columbia (Little Falls, Ward, 1877), Virginia (Smyth Co., Small, May 24 and July 9, 1892, and Britton and Vail, June 1892), West Virginia (White Sulphur Springs, Britton, Aug. 19, 1890), Kentucky (hb. Gray and hb. Chapman), Missouri (Jackson Co., Bush, Sept. 28, 1893), Ohio (Cincinnati, Lloyd, 1888; Ashtabula Co., Bogue, 1892), Indiana (Indianapolis, Britton, Aug. 23, 1890, Hitchcock, Aug. 25, 1890; Wabash, Mills, June 9, 1873), and Michigan (Lansing, Wheeler, May 1890 and June and Oct. 1891; Bailey, Sept. 15, 1887 and May 24, 1888). — Cultivated in St. Louis.

Specimens from Vermont (Pringle, 1879; Robbins) and Missouri (Allenton, Letterman, Sept. 25, 1880; Jackson

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\* Rush states, in the American Philosophical Transactions, 1793, iii. 65, that sugar trees tapped by "a small woodpecker which feeds upon the sap" (the sap sucker) afterward acquire a black color and possess sweeter sap than the others, but he does not note that the same result follows tapping for sugar, and it may be inferred that he had under his observation trees of the black maple or var. *barbatum*, which, possessing sweeter sap, may prove more attractive to these birds.

Co., Bush, Sept. 27, 1893), without stipules, possess the green lower leaf surface and, in part, the general aspect of this variety, but I am doubtful whether to place them here or in the preceding variety, and the same may be said of a specimen collected at Houghton, Mich., by Engelmann in 1878.

**ACER FLORIDANUM** (Chapman) Pax, Engler's Jahrb. 1886, vii. 243; von Schwerin, Gartenflora, xlii. 457.—*A. saccharinum* var. *Floridanum* Chapman, Fl. So. U. S. (1860), 81.—*A. saccharinum* subsp. *Floridanum* Wesmael, Acer, 61.—*A. barbatum* var. *Floridanum* Sargent, Garden and Forest, iv. 148, and Silva, ii. 100, pl. 91.—*A. saccharum* var. *Floridanum* Sudworth, Rept. Dept. Agr. 1892, 325.

Bark dark (?) ; internodes very slender, elongated, mostly dull, reddish becoming gray; buds globose-ovoid, obtuse, very small for the group, gray to dark brown; petioles very slender, little if at all dilated, without stipules; leaves thin but firm, or typically thicker and coriaceous, flat, medium sized to small (usually 2 to 4 in. broad), rather dark green and glossy above, below whitened and from subglabrous to very tomentose, broader than long, truncate or shallowly and openly cordate at base, 3- to 5-lobed, with variously open sinuses, the lobes sinuously narrowed to the broad very obtuse apices, or more or less parallel sided and 3-lobed above; fruit small ( $4 \times 6$  mm.), the outer line of the small wings ( $6 \times 12$  mm.) forming about a right angle. — Plates 8 to 10.

Range, Georgia to Florida, Mississippi, Louisiana and Arkansas. — Specimens examined from Georgia (Columbus, Curtiss, 1875), Florida (Chattahooche, Curtiss, Mar. 1880, 497\*; Vasey, 1892), Alabama (Girard; Troy, Mohr, June 1880; Walnut Creek, Mohr, May 20 and July 31, 1880), Mississippi (Quitman, Mohr, May 16 and 20, 1880), and Arkansas (Fulton, Letterman, May 4, 1881). Two specimens from Louisiana (Alexandria, Hale, and Sodus, Letterman, Sept. 1883), have the leaves more acutely and

incisely lobed than usual, and green below, as in the next variety.

**ACER FLORIDANUM** var. **ACUMINATUM**.

Characters of the type, but the leaves green below, isodiametric, shallowly 3-lobed with long tapering pointed apexes. — Plate 11.

Range, North Carolina to Georgia and Alabama. — Specimens examined from North Carolina (Stanley Co., Small & Heller, Aug. 18, 1891, 381; Dr. Hunter), Georgia (Rome, Ravenel, 1871), Alabama (Choctaw Co., Mohr, Aug. 20, 1880; Walker Co., Mohr, Aug. 16, 1880; Cullman, Mohr, June 18, 1891; Mt. Sterling, Mohr, Aug. 19, 1880).

The forms of this variety and of *A. Rugelii* Pax, bring *Floridanum* and *saccharum* var. *barbatum* close together.

**ACER GRANDIDENTATUM** Nutt. in Torr. & Gray, Fl. i. (1838), 247; Sargent, Census Rept. 48; Pax, Engler's Jahrb. vii. 220; Wesmael, Acer, 46; Schwerin, Gartenflora, xlii. 325. — *A. barbatum* var. *grandidentatum* Sargent, Garden and Forest, iv. 148, and Silva, ii. 100, pl. 92. — *A. saccharum* var. *grandidentatum* Sudworth, Rep. Sec. Agricult. 1892, 325.

Bark gray; internodes elongated, rather stout, dark red, more or less glossy, becoming light gray the second year; buds dark reddish brown, conical, acute, the pointed scales somewhat loose at tip and lined with long white hairs; petioles rather abruptly dilated, without stipules; leaves coriaceous, medium sized (usually 3 to 4 in. broad), flat, clear green and dull above, more or less pale and velvety below, isodiametric or commonly broader than long, usually rather deeply cordate with open basal sinus, 5-lobed with open sinuses, the upper three lobes commonly dilated upwards and, like the lower margin of the outer lobes, serrately 2- to 3-lobed on each side, all of the lobes typically rather acute; fruit large (6 × 6 mm.), the outer lines of the rather large wings (10 × 20 mm.) forming a right angle, while the inner are subparallel. — Plates 12 to 13.

Range, Montana to Nevada, New Mexico, South Central Texas, and Northern Mexico. — Specimens examined from the Rocky Mountains (Nuttall), Utah (Wasatch Mts., Watson, May 1869, 214; Provost's Fork, Fremont, 1845, 305; City Creek Cañon, Engelmann, 1880, Jones, 1893, and 1880, 1437; Glenwood, Ward, 1875, 197; Parry, 1874, 29; Hooker & Gray, 1877), Nevada (Wheeler, 1872), Arizona (Ash Creek, Rothrock, 1874, 303; Huachuca Mts., Lemmon, 1882, 2650, Pringle, 1884; Sta. Catalina Mts., Lemmon, 1881, 121), New Mexico (Mogollon Mts., Greene, Apr. 25, 1881, Rusby, 1881, 69), Texas (Boerne, Sargent, Mar. 27, 1887; Guadalupe Mts., Havard), Mexico (Mt. Caracol, Palmer, Aug. 1880; San Luis Mts., Mearns, 1892, 71).

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When destitute of flowers, fruit, and even foliage, during the winter season, the several species of maple occurring in the United States may usually be recognized with certainty by one who is familiar with the characters afforded by their bark, twigs, and buds; and it is hoped that the following winter synopsis, with the accompanying plates, may prove useful to botanists who wish to familiarize themselves with trees in their winter appearance, and to teachers, who will find the study of twigs in winter a very good means of developing the power of observation in pupils.

ACER. — Trees or shrubs with rather slender nearly terete twigs, somewhat four-sided minutely crenulate continuous pith, low opposite v-shaped leaf scars mostly connected by transverse lines, three evident bundle scars (or the uppermost often divided into two, and the number increased to seven or nine in *macrophyllum*), and medium sized ovoid or conical more or less stalked buds with their outer scales ending in small scars where rudimentary blades have fallen away. — The branches often end in dried remnants of the inflorescence, or in a scar when they have fallen, the terminal bud is often abortive in *circinatum*, and in the soft

maples the axillary buds are frequently accompanied by globose collateral or even superposed buds which, however, develop within the axils of the lowermost scales of the main bud, and so represent branches of the normal axillary branch, and not proper supernumerary buds.

## KEY TO THE SPECIES.

- \* Buds evidently stalked, with few scales, these valvate in pairs so that all but the outer two are concealed: leaf scars acute margined: pith brown. — Bush Maples.  
 Buds large (6 to 10 mm. long exclusive of stalk), glabrous: twigs glabrous, with a more or less developed decurrent line between the nodes: bundle scars often 5 to 7....*A. pennsylvanicum*.  
 Buds small (about 5 mm. long including the stalk).  
 Twigs and buds glabrous, the latter plump.....*A. glabrum*.  
 Closely gray pubescent, the buds slender.....*A. spicatum*.
- \*\* Buds not evidently stalked, the outer pair of scales separated, hairy-tufted at apex: leaf scars acute margined, their axils more or less hairy: pith white or at length yellowish. — Vine Maples.  
 Twigs and buds at first pubescent with long, loose hairs, and generally viscid.....*A. circinatum*.
- \*\*\* Buds large, ovoid, the lateral appressed, not evidently stalked, but sometimes lengthening into short, leafless branches the first year: exposed scales 6, or in reduced lateral buds only 2, the lower pair fused at base: leaf scars meeting, glabrous. — Sycamore Maples.  
 Twigs very stout, glabrous and glaucous: pith brownish: bundle scars 7 to 9.....*A. macrophyllum*.
- \*\*\*\* Buds short stalked, often appearing sessile: exposed scales 6 or more, ciliate, several pairs not meeting at apex, but the outermost pair often fused below.  
 + Exposed scales 6 to 8, red or reddish, tomentose ciliate, the lowest pair commonly deciduous in early winter, exposing a collateral bud on either side: leaf scars of a given pair rarely contiguous: pith pinkish. — Soft maples.  
 Bark gray, falling away in large thin flakes on old trees: twigs glabrous, reddish.....*A. saccharinum*.  
 Bark whiter, rough on old trunks, but not flaking in large pieces.  
 Twigs red, glabrous.....*A. rubrum*.  
 Twigs tomentose above.....*A. rubrum* var. *Drummondii*.
- + + Exposed scales 8 to mostly 12 to 16, brown to nearly black, often with silky gray pubescence: no collateral buds: leaf scars acute margined, each pair almost meeting by their outer angles, their axils commonly gray or yellow pubescent. — Sugar maples.

- ↔ Buds rather large (about 5 mm. long): twigs relatively stout.  
 Twigs deep red, glossy: buds conical, acute, nearly black: leaf-  
 scars often separated ..... *A. grandidentatum*.  
 Twigs reddish buff.

Buds conical, acute, gray pubescent: twigs mostly glossy.

..... *A. saccharum*.

Buds conical ovoid, often obtuse, usually darker: twigs mostly  
 dull: bark of trunk mostly dark..... *A. saccharum* var. *barbatum*.  
 Twigs green to gray buff, dull.

Buds ovoid-conical, often very obtuse: bark of trunk black.

..... *A. saccharum* var. *nigrum*.

- ↔ ↔ Buds small (2 to 3 mm. long), globose-ovoid, usually very  
 obtuse: twigs very slender..... *A. Floridanum*.

### GROUP I. BUSH MAPLES (PLATE 14).

Buds evidently stalked, with valvate scales.

**A. PENNSYLVANICUM L. (Striped Maple).** — Shrub or small tree. Bark rather thin, green brown or red with narrow white longitudinal lines and often transversely warty, or at length dark gray; twigs relatively stout, glabrous except for a few brown hairs at the uppermost node, green or red, without conspicuous lenticels; leaf scars broad, with often five or seven bundle scars; buds red, glossy, 6 to 10 mm. long exclusive of the rather long stalk. — Canada to Minnesota, south to the mountains of Georgia.

**A. GLABRUM Torrey (Dwarf Maple).** — Shrub or small bushy tree. Bark thin, gray to brown, smooth; twigs glabrous, slender, mostly bright red, becoming white or gray, with few small dark inconspicuous lenticels, their epidermis flaking off in a thin silvery film after which the gray or buff and red coloration is more or less in reticulated striae; leaf scars as in the following; buds plump, often wing-margined, mostly bright red, glabrous. — British Columbia to Southern California, Colorado, Northwestern Nebraska, and the mountains of New Mexico, Arizona, and Nevada.

**A. SPICATUM Lam. (Mountain Maple).** — Shrub or small bushy tree. Bark very thin, reddish brown to dingy gray, with buff lenticels, smooth or slightly furrowed; twigs gray tomentose above, slender, greenish with one side



mostly red or purple, their lenticels few and inconspicuous; leaf scars very narrow, margined and nearly meeting; buds green or reddish, densely covered with very short appressed gray hairs. — Canada to Saskatchewan, south to Virginia, Kentucky, and the mountains of Georgia.

## GROUP II. VINE MAPLES (PLATE 14).

Buds nearly sessile, the outer pair of scales separated.

**A. CIRCINATUM** Pursh (Vine Maple). — Spreading or prostrate shrub or small tree. Bark very thin, dingy grayish-brown, generally with slightly marked or no lenticels, closely and shallowly white grooved; twigs mostly viscid and with sparse long and soft hairs, slender, greenish to red, without conspicuous lenticels; leaf scars with appressed thin border, ciliate in the axils; buds broadly conical, rather obtuse, with more or less abundant long hairs, the terminal frequently abortive and concealed by the enlarged uppermost pair of lateral buds; pith in my specimens rarely a little brownish. — British Columbia to the mountains of northern California.

## GROUP III. SYCAMORE MAPLES (PLATE 15).

Buds nearly sessile, large: exposed scales mostly 6.

**A. MACROPHYLLUM** Pursh (Long-leaved Maple). — Tree of medium or large size. Bark gray-brown, thick, deeply fissured, with anastomosing ridges; twigs stout, glabrous, green to purple, somewhat glaucous, with numerous small lenticels; pith brownish; leaf scars broad, contiguous, with 7 to 9 bundle scars; buds purplish, large, plump, ovoid, red or green, the lateral closely appressed. — Alaska to southern California.

## GROUP IV. SOFT MAPLES (PLATE 15).

Buds nearly sessile, mostly red: exposed scales 6 to 8.

**A. SACCHARINUM** L. — *A. dasycarpum* (Silver Maple). — Large diffusely branched tree. Bark moderately thick,

gray, on old trunks falling away in large flakes so as to expose the brown inner layers; branches smooth, gray; twigs glabrous, reddish, with scattered pale brown elongated lenticels which are crowded and very prominent on dwarf shoots; buds red or brown, the inner scales of flower buds red tomentose above on the back.—New Brunswick to Dakota, Indian Territory and Florida.

**A. RUBRUM** L. (Red Maple).—Large tree of more compact growth. Bark thinner, dark gray, rough but not separating in large flakes; branches smooth, gray to almost white; twigs as in the last, but with whiter lenticels; buds often nearly black.—New Brunswick and Canada to Dakota, Missouri, Eastern Texas, and the South Atlantic States. Not separable from the Silver Maple by its twigs, but easily recognized when the bark of the branches and trunk is seen.

**VAR. DRUMMONDII** (Hook. & Arn.) Sargent (Woolly Swamp Maple).—Large tree. Bark about as in the type, or even whiter and smoother; twigs gray, densely covered above with white wool, as are the buds.—Swamps, Georgia to the Gulf, west to Texas, and thence northwards to southeastern Missouri.

#### GROUP V. HARD OR SUGAR MAPLES (PLATE 16).

Buds nearly sessile, gray to brown or black: exposed scales 8 to 16.

**A. GRANDIDENTATUM** Nuttall (Western Hard Maple).—Small tree. Bark thin for the group, light gray, smooth or finally separating in thickish flakes about 2 in. long; twigs glabrous, dark red, with scattered very small pale lenticels, at length striate and gray; buds conical, acute, nearly black, the scales often sharp-pointed and the upper more or less silvery pubescent.—Montana to the mountains of Nevada, New Mexico, Southern Texas and Mexico.

**A. SACCHARUM** Marshall (Sugar Maple).—Large round-topped tree. Bark thick, gray, rough; twigs buff, more or

less tinged with orange, glossy, becoming gray, with small pale lenticels; buds conical, acute, gray pubescent.—Nova Scotia to West Virginia, west to Illinois and Canada.

Var. *BARBATUM* (Michx.) Trelease (Thick-leaved Sugar Maple).—Size and habit of the type. Bark mostly dark; twigs with mostly shorter internodes, reddish buff, duller; buds conical ovoid, stouter and more obtuse, often nearly black.—Connecticut to Michigan, south to Tennessee and Missouri.

Var. *NIGRUM* (Michx. f.) Britton (Black Maple).—Bark black; twigs gray or green buff, dull; buds ovoid, dark, mostly very obtuse.—Vermont to Virginia, Kentucky, Missouri and Michigan.

A. *FLORIDANUM* (Chapman) Pax (Southern Sugar Maple).—Tree of medium size. Bark dark (?); twigs glabrous, very slender, reddish becoming gray, with numerous prominent lenticels, mostly dull; buds globose ovoid, obtuse, brown to nearly black, very small for the group.—Georgia to Florida, Louisiana and Arkansas.

Var. *ACUMINATUM* Trelease, can not be separated in its winter condition, so far as my material shows, but it is not improbable that a study of trees in the field may reveal good winter characters.

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The Box Elder, *Acer Negundo* L., now generally kept apart in the genus *Negundo*, has the general characters of the Sycamore Maples, but the closely appressed hairy lateral buds have only two outer scales, and the thin margined leaf scars are mostly glandular ciliate and have 3 large bundle scars. The twigs are green or purple, very glaucous in the western form, and glabrous, except occasionally near the nodes, or throughout in the southwestern plant.

## EXPLANATION OF PLATES.

All of the illustrations were drawn by Miss Grace E. Johnson, under the supervision of the author.

## THE SUGAR MAPLES.

Plate 4. *Acer saccharum*, typical form, natural size, with winter twig,  $\times 3$ .

Plate 5.—*A. saccharum* var. *barbatum*, natural size (from a Michigan specimen), with winter twig,  $\times 3$  (from a Missouri specimen).

Plate 6.—*A. saccharum* var. *barbatum*, natural size (one of the originals of *A. Rugelii*, from Knoxville, Tenn.,— the isolated fruit and bud specimen from Rugel's Dandridge material), with bud characters,  $\times 3$ .

Plate 7.—*A. saccharum* var. *nigrum*, natural size; with winter twig,  $\times 3$ .

Plate 8.—*A. Floridanum*, natural size (from Curtiss' Chattahooche material).

Plate 9.—*A. Floridanum*, natural size (from Vasey's Chattahooche specimens), with bud characters,  $\times 3$  (from Letterman's Sodus material).

Plate 10.—*A. Floridanum*, natural size (from Mohr's Quitman specimens).

Plate 11.—*A. Floridanum* var. *acuminatum*, natural size (from Small and Heller's No. 381), with bud characters,  $\times 3$ .

Plate 12.—*A. grandidentatum*, natural size (from Jones' material).

Plate 13.—*A. grandidentatum*, natural size (a Mexican form, from Mearns' material).

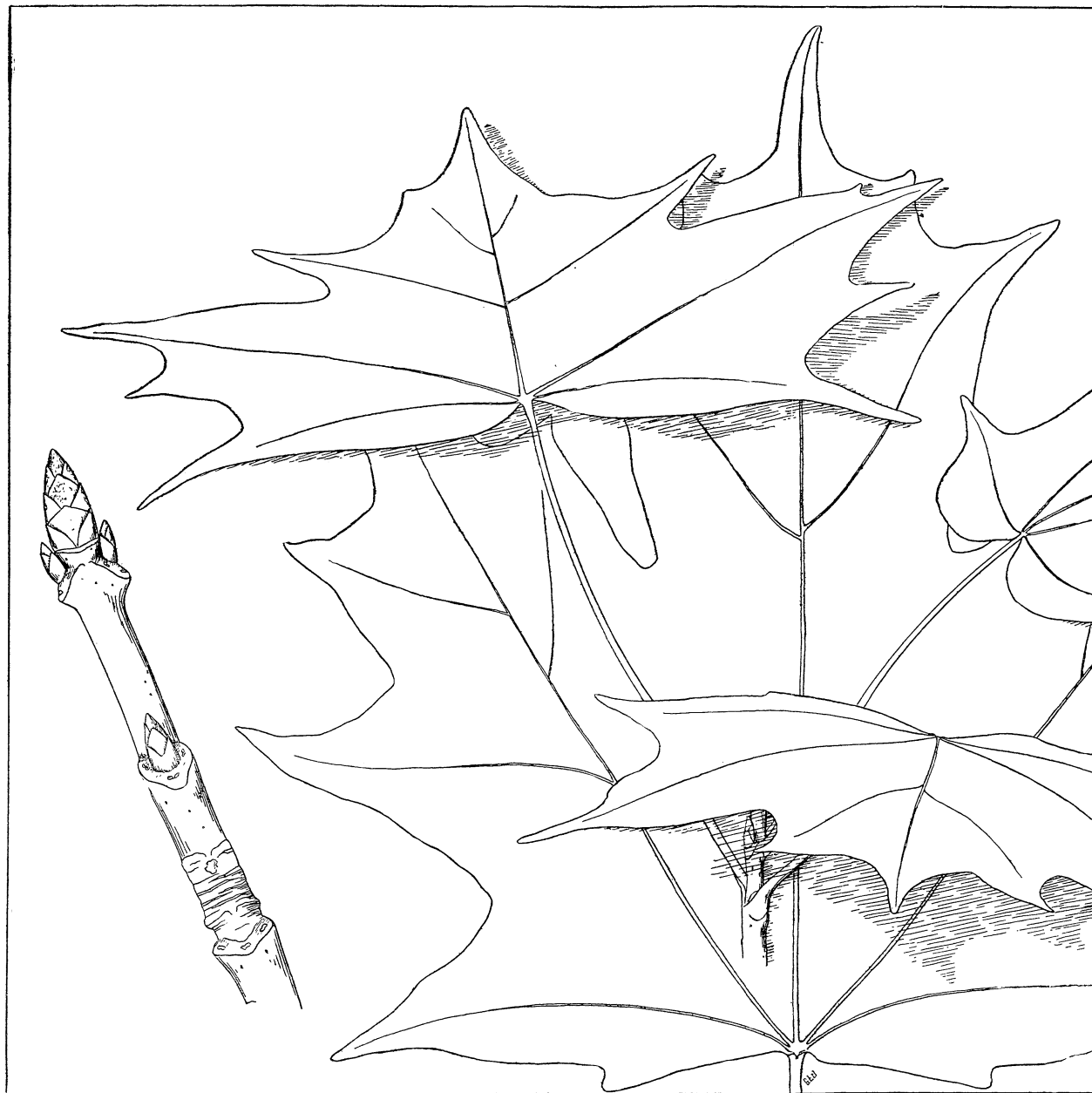
## WINTER CHARACTERS OF MAPLES.

(Twigs natural size: details  $\times 3$ ).

Plate 14.—1 to 3, *A. Pennsylvanicum*; 4 to 6, *A. glabrum*; 7 to 9, *A. spicatum*; 10 to 13, *A. circinatum*.

Plate 15.—14 to 16, *A. macrophyllum*; 17 to 18, *A. saccharinum* (*dasy-carpum*); 19 to 23, *A. rubrum*; 24 to 26, *A. rubrum* var. *Drummondii*.

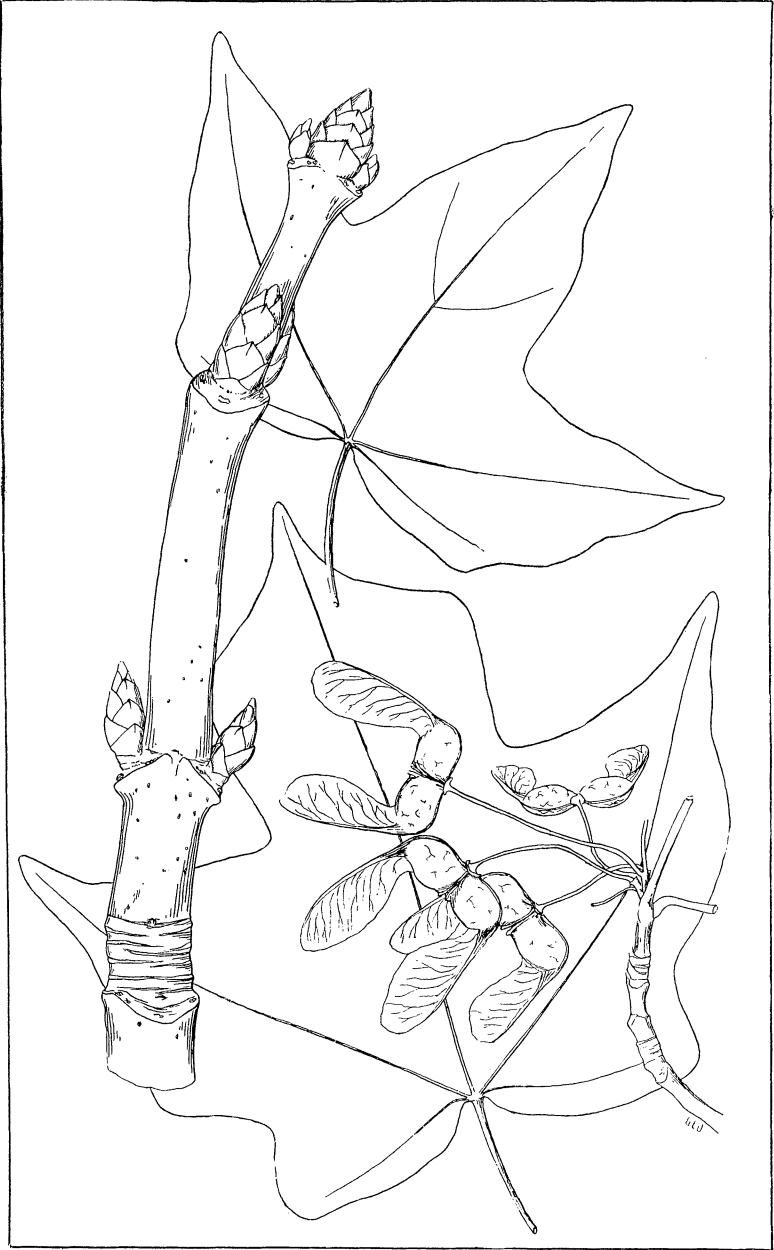
Plate 16.—27 to 29, *A. grandidentatum*; 30 to 32, *A. saccharum*; 33 to 34, *A. saccharum* var. *barbatum*; 35 to 36, *A. saccharum* var. *nigrum*; 37 to 38, *A. Floridanum*.



ACER SACCHARUM.



ACER SACCHARUM.

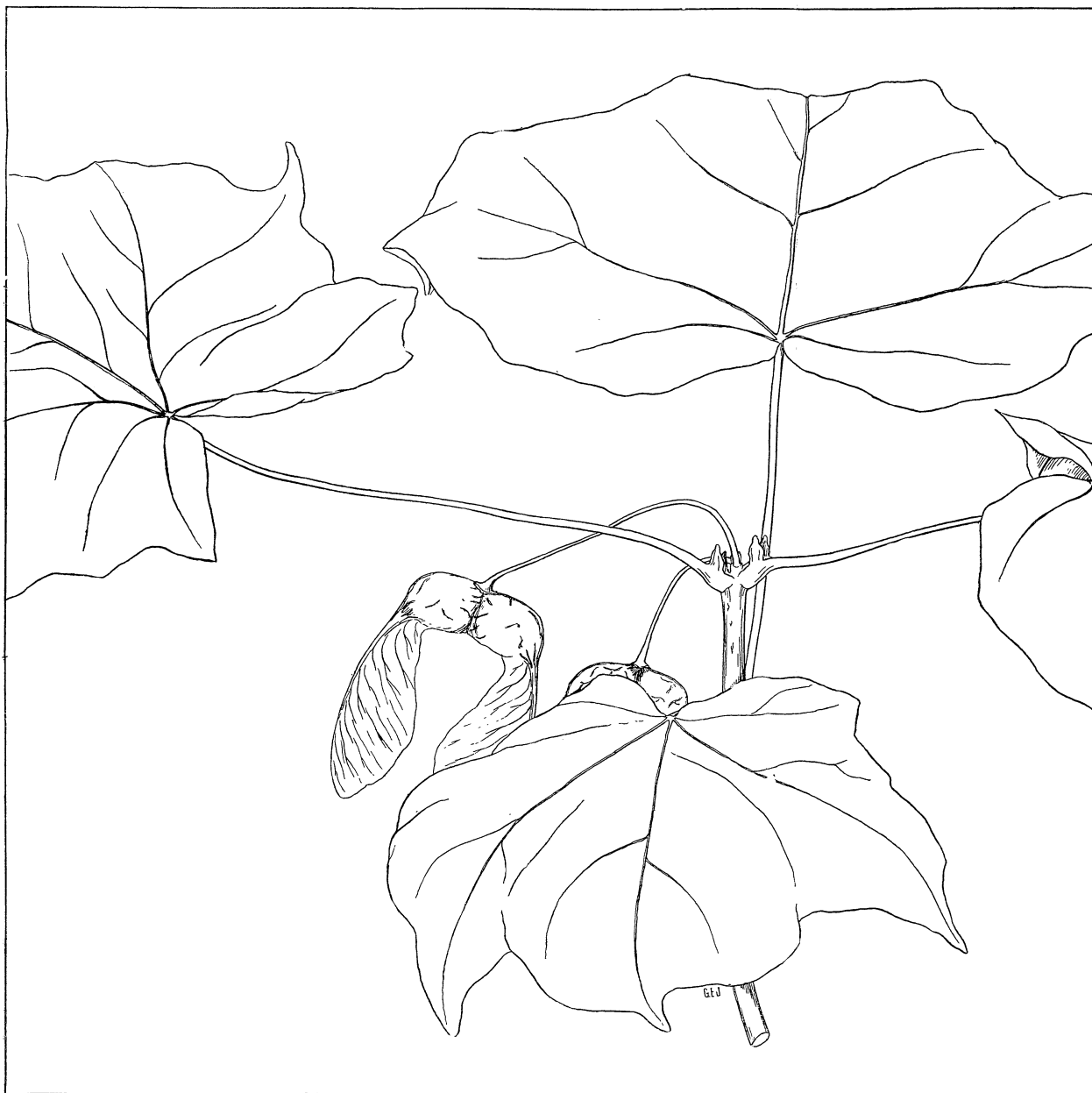


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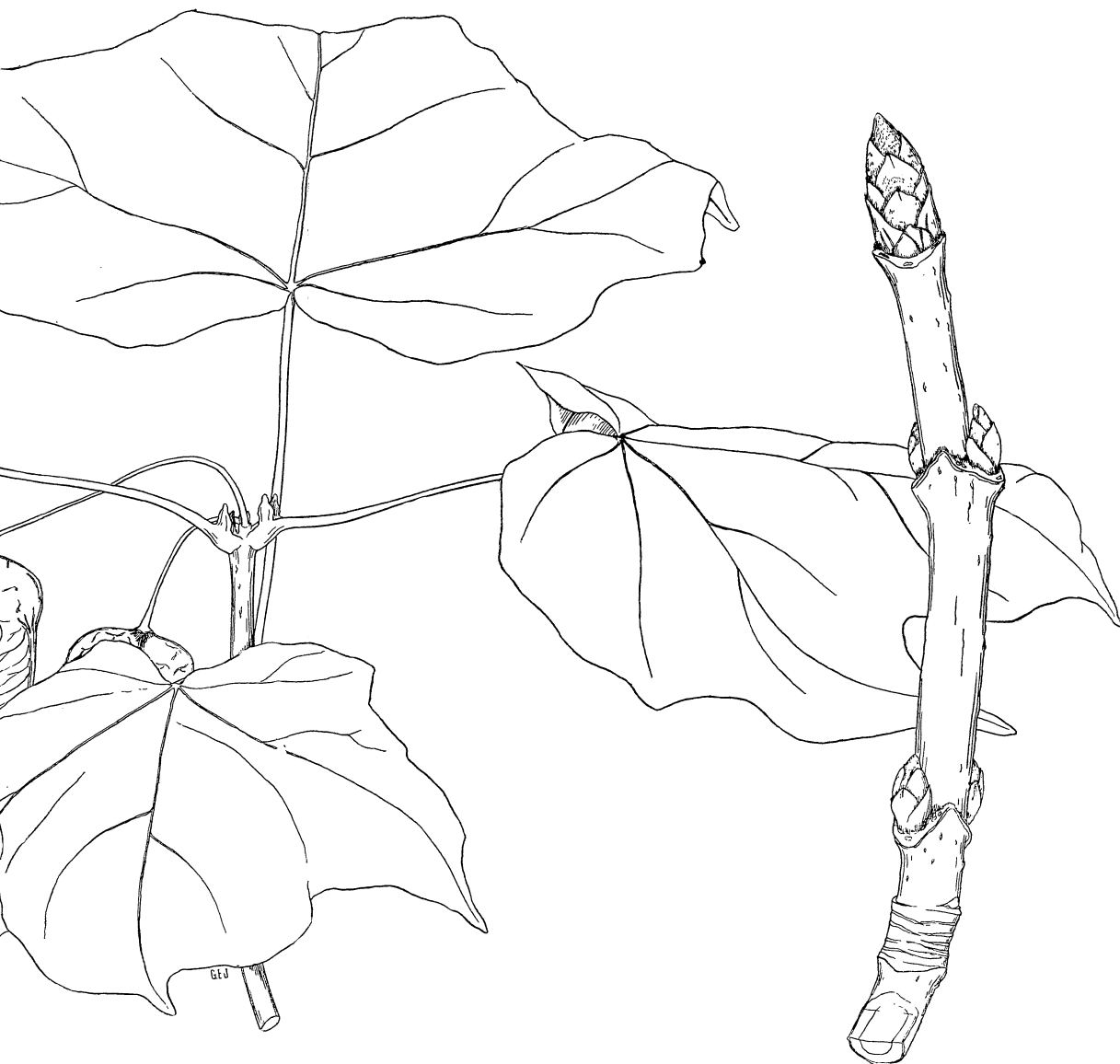


ACER SACCHARUM VAR. BARBATUM.  
(A. RUGELII.)





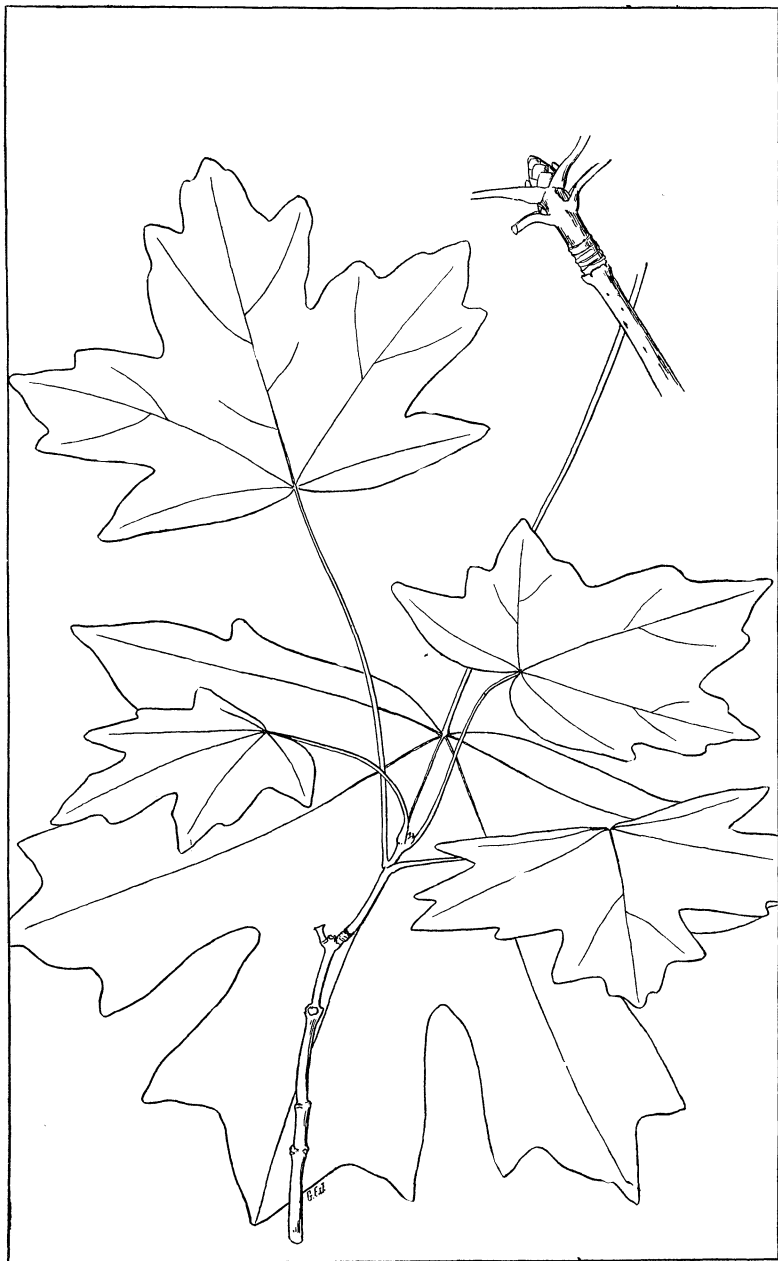
ACER SACCHARUM VAR. NIGRUM.



ACER SACCHARUM VAR. NIGRUM.



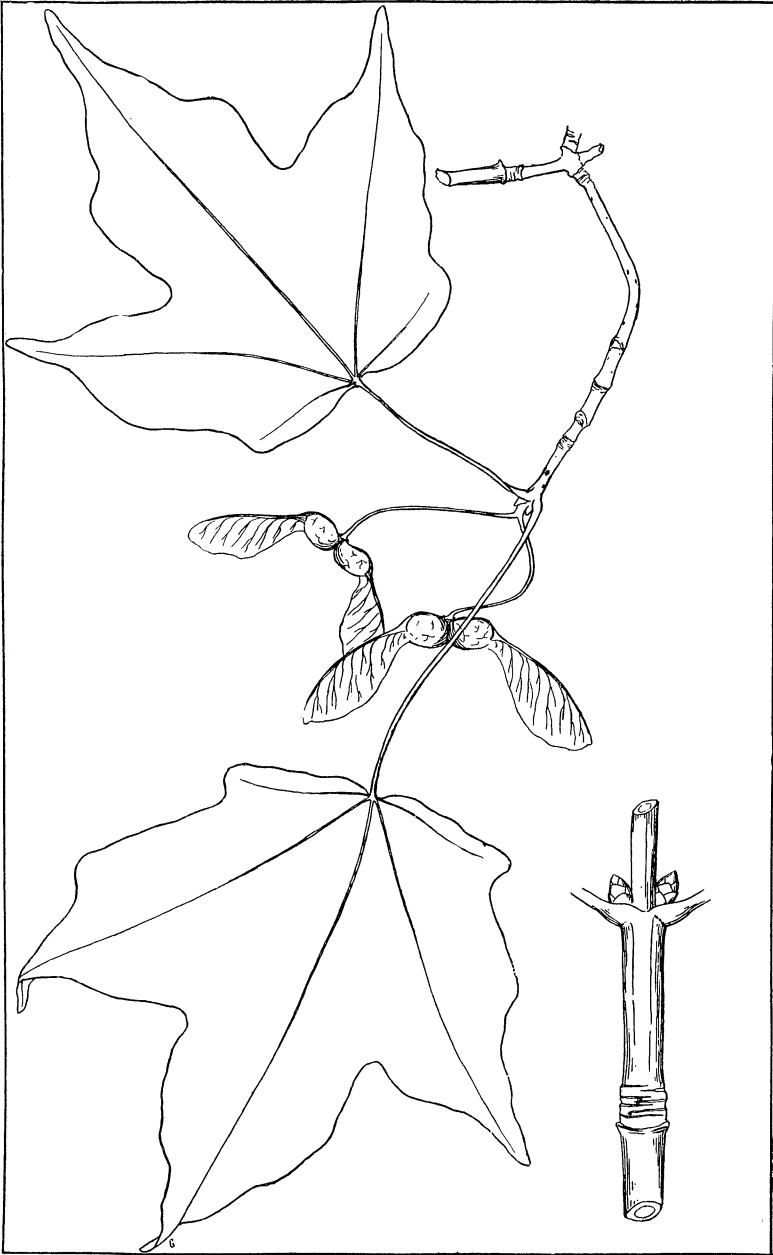
ACER FLORIDANUM.



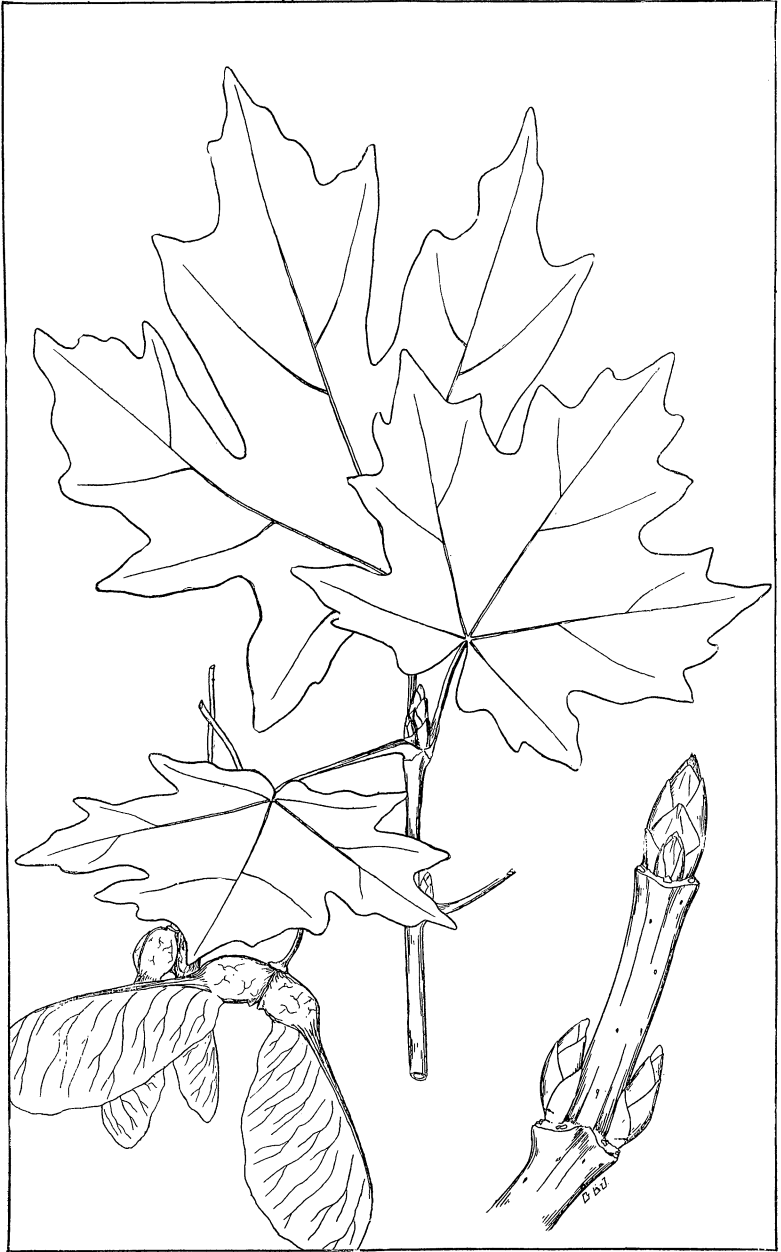
ACER FLORIDANUM.



ACER FLORIDANUM.



ACER FLORIDANUM VAR. ACUMINATUM.

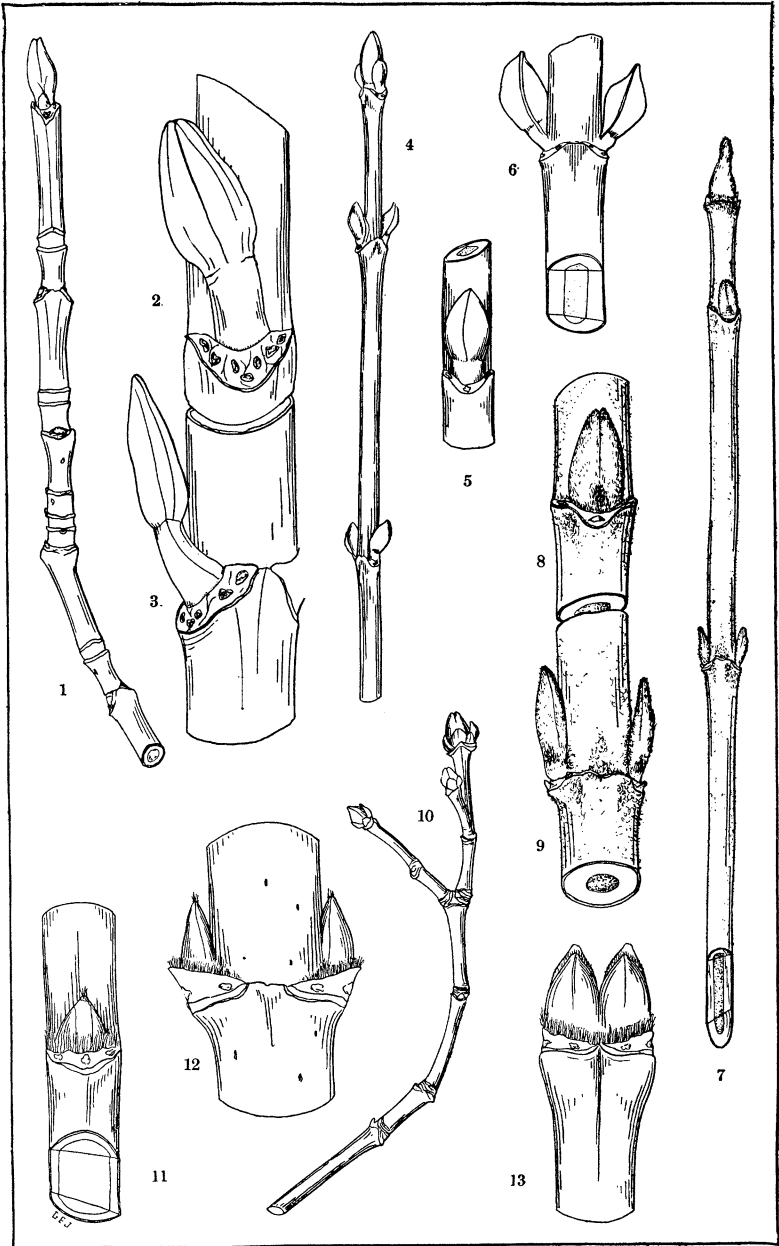


ACER GRANDIDENTATUM.

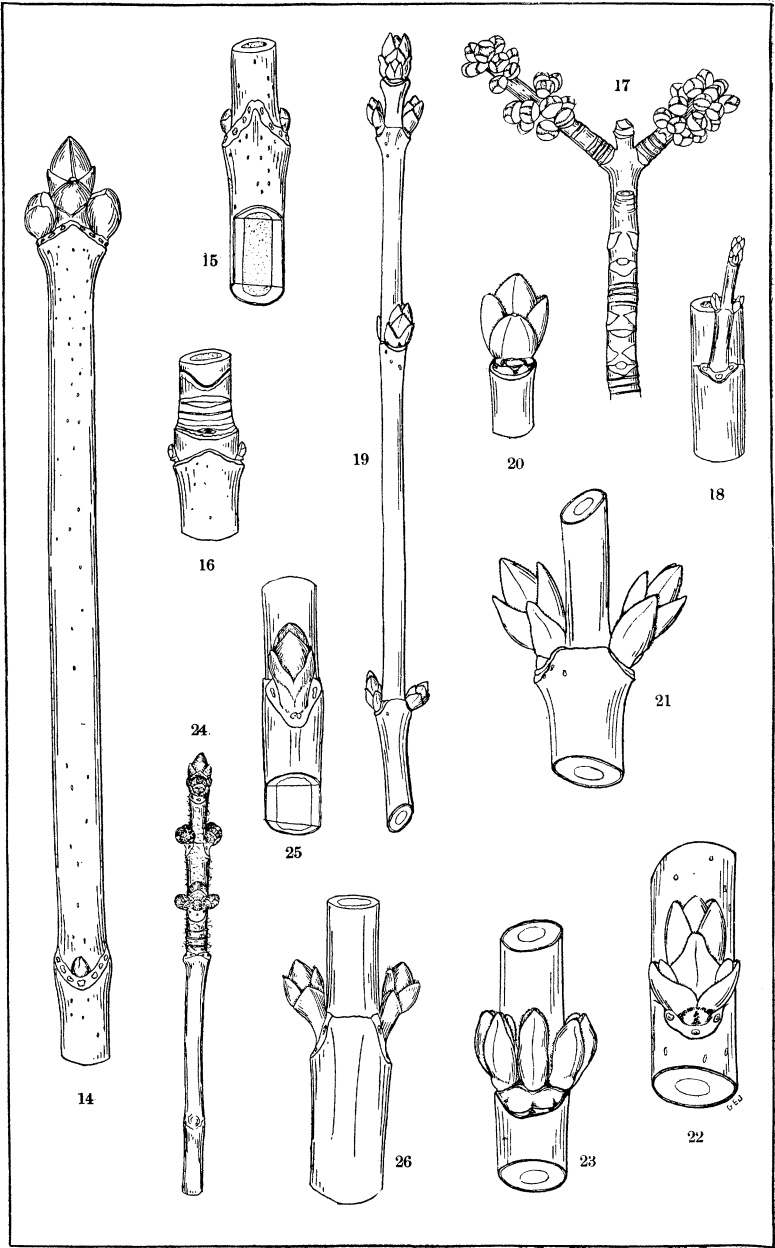


ACER GRANDIDENTATUM.

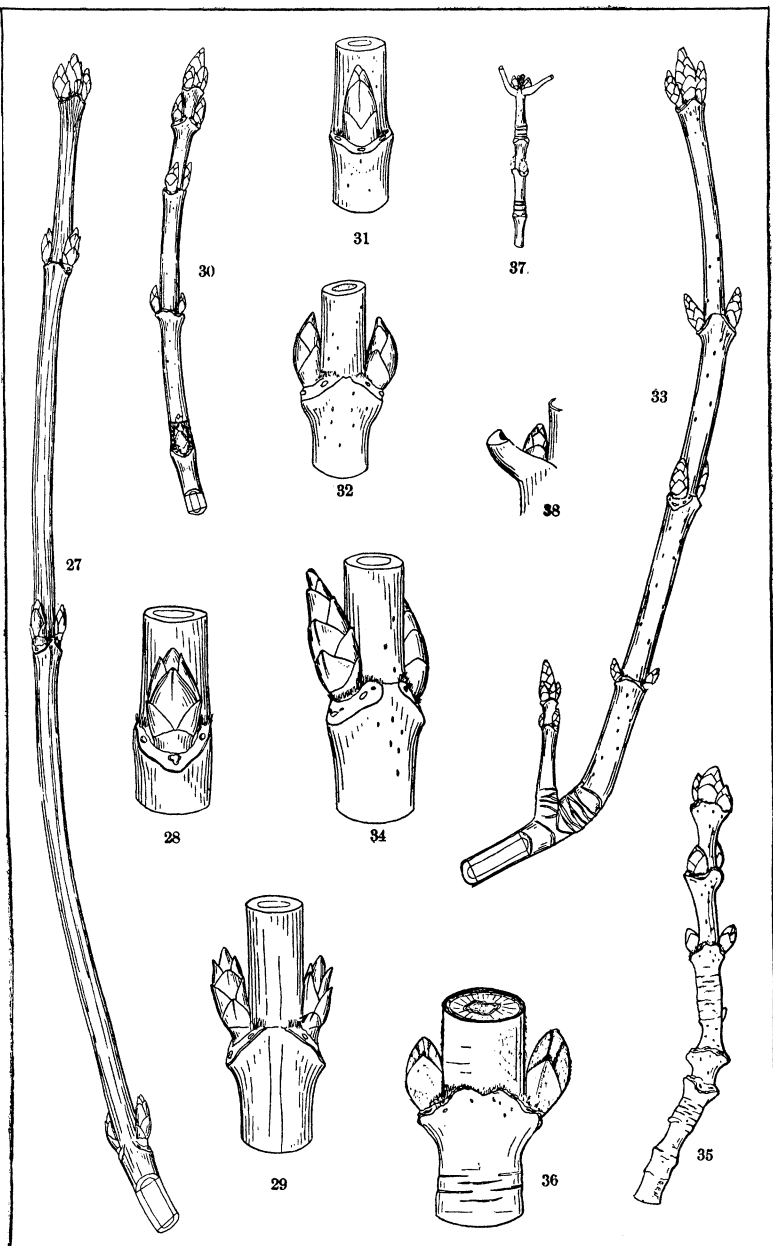




BUSH AND VINE MAPLES IN WINTER.



SOFT MAPLES IN WINTER.



SUGAR MAPLES IN WINTER.